

Original Research Article

Functional outcome assessment for surgical decompression of cervical spondylotic myelopathy

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ABSTRACT

Background: Cervical spondylotic myelopathy (CSM) is one of the most common dysfunctions of spinal cord occurs due to degenerative changes in cervical spine disc and facet joints. It is a form of progressive spine disease including herniated disc and spinal cord stenosis which manifests as changes in gait, skilled hand movements, muscle strength, bladder dysfunction etc. Recent studies and trials have established that surgical decompression of cervical spinal is a cost-effective treatment modality which provide satisfactory functional recovery. This study aimed at the functional outcome of surgical decompression of CSM.

Methods: The prospective study of 100 cases of cervical myelopathy for which decompressive surgery was done from August 2020 to August 2021. Results were analysed according to Nuricks and modified Japanese orthopedic association scoring system (MJOA).

Results: Seventy one males and 29 females were included in this study with average age was 53 and average hospital stay was 3.55 days. Average pre-op Nurick score was 1.93, while score after 6 months and 1 year were 1.44 and 1.15 respectively. Average pre-op MJOA score was 13.63, while score after 6 months and 1 year were 14.58 and 15.74 respectively.

Conclusions: The functional results of decompressive surgeries for cervical myelopathy are satisfactory. Both anterior and posterior approaches are recommended for multiple cervical myelopathy with comparable outcomes. DM and age was observed as the independent predictor for functional outcome, while, gender and level of disease got less significant predictive value.

Keywords: Cervical spondylotic myelopathy, Decompression surgeries, ACDF, Corpectomy

INTRODUCTION

Cervical spondylotic myelopathy (CSM) is the most common cause of myelopathy of the cervical spine which accounts for degenerative pathology with narrowing of cervical spinal canal. As CSM is having an indolent course with more detrimental progressive way and characterised by a series of complex long tract signs and symptoms. Although literatures regarding the changes in myelopathic signs following decompression surgeries are very few.^{1,2}

The incidence of CSM is expected to rise in ageing population and it is estimated to effect upon 5% of population older than 40 years. Although the CSM is a common entity, the diagnosis and proper treatment are usually delayed. The causes are multi factorial.

The etiology of CSM as described in literatures is the age-related alterations to spinal cord including degeneration of facet joints, inter vertebral disc or vertebral bodies, hypertrophy of ligamentum flavum and ossification of longitudinal ligaments.³

These all factors cause chronic compression of spinal cord and changes in cord.

In symptomatic patients, surgery can improve neurological outcome and effectively stop the further deterioration. But post-operative functional outcome has got numerous constraints such as age, co-morbidities, chronic myelomalacia, and surgical technique. Many studies have done to investigate these constraints and their relationship.^{4,5}

Objectives

To know the functional outcome of cervical spondylotic myelopathy decompression surgeries and to know the factors that predicts the outcome of CSM surgeries.

METHODS

This prospective study was conducted in The Department of Neuro Surgery, Government Medical College, Kottayam from August 2020 to August 2021. After selecting the patients according to inclusion and exclusion criteria, well informed consent was taken.

A detailed questionnaire was used to collect the required data from the patient. Detailed preoperative assessment done according to Nuricks grading and modified Japanese orthopedic association scoring system. CT scan and MRI scan were taken for the patient preoperatively. All patients underwent decompression surgery with fusion under general anesthesia. Post-operative assessment was done immediately after surgery, at 2

weeks and at 6 months of follow up. Post-operative complications with revision surgeries if needed was also noted.

According to study conducted by Singrakhia et al, all cases of CSM presenting to IP/OP above age 18 years who underwent decompression surgery with fusion.⁴ The Institutional review Board Government Medical College, Kottayam had given ethical clearance for this study (67/2020). SPSS software was used for analysis.

Inclusion criteria

All cases of CSM above age 18 years and below 75 years.

Exclusion criteria

All traumatic injury cases were excluded.

RESULTS

Age distribution

Patients were grouped according to their ages. More people were in age group 50-60, consisting of about 39 patients (Table 1). The average age of the patients was 53 years. Pre-operative and post-operative Nurick score were observed and difference was comparable.

Patients with Nurick score improvement were depicted in Table 2, and there was statistically significant improvement in score below age 65 years.

Table 1: Distribution of surgeries according to the age.

Age (years)	ACDF	Corpectomy	Laminectomy	Total	Pre-op mean Nurick score	Mean Nurick score after 1 year of surgery	Difference in score
<40	6	4	0	10	1.8	1.1	0.7
40-50	13	10	2	25	1.76	1.08	0.66
50-60	22	12	5	39	1.93	1.15	0.78
60-70	8	8	7	43	2.2	1.20	0.8
>70	2	0	1	3	2	1.5	0.5

Table 2: Age statistics.

Age (years)	Improvement in Nurick score	No improvement
<65	75	7
>65	10	8

Sex distribution

In this study out of total 100 patients, 71 patients were males and 29 females. When the patients preoperative and post-operative Nurick score and MJOA score were

analysed, no statistically significant observations were found (Tables 3 and 4).

Comorbidities of patients

Twenty-four patients in this study was known diabetic, 14 were hypertensive and four patients were hypothyroidic. The outcomes were analysed, there observed a statistically significant Nurick score were observed in patients who were non-diabetic (Tables 5 and 6).

Table 3: Gender wise distribution.

	Average age	Scoring system	Pre-op	After 6 months of surgery	After 1 year of surgery	Difference in scores
Male	55.2	Nurick	1.9	1.34	1.1	0.8
		MJOA	13.79	14.7	16.03	2.23
Female	51.8	Nurick	1.95	1.45	1.16	0.79
		MJOA	13.5	14.5	15.6	2.10

Table 4: Gender statistics.

Sex	Improvement in Nurick score	No improvement
Male	62	9
Female	23	6

Chi-square statistics =0.156, p value =0.692

Table 5: Outcome of patient with DM.

Score	Pre-op	After 6 months of surgery	After 1 year of surgery	Difference
Mean Nurick	2.41	1.70	1.87	0.54
Mean MJOA	13.94	14.23	15.23	1.29

Table 6: DM and statistics.

Comorbidity	Improvement in Nurick score	No improvement
DM present	16	8
Absent	69	7

Chi square statistics =8.32, p value =0.00391

Surgical outcomes

Most cases done in this study was ACDF, 51 cases. Corpectomy was done for 34 cases and laminectomy with lateral mass fixation was done for 15 cases. In all surgical groups there observed similar improvement in mean MJOA score (Table 7).

Table 7: Outcome of patients in ACDF group.

	Pre-op mean MJOA score	Mean MJOA score after 6 months of surgery	Mean MJOA score after 1 year of surgery	Diff. in mean score
ACDF group	13.84	14.64	15.76	1.92
Corpectomy group	13.3	14.55	15.82	2.52
Laminectomy and lateral mass group	13.6	14.4	15.46	1.86

DISCUSSION

CSM is the commonest spinal cord disorder among elderly population and is seen in people above 40 years. In this study, the results of 100 cases of CSM who underwent surgical decompression and fusion were analysed and there were more cases in the age group between 40 and 60 years. The cause of increased number of CSM in middle aged group may be due to life style changes. Zhang et al also showed similar findings with more prevalence of CSM in age group 40-60 years.⁶

The natural history of CSM had not documented well in literatures with substantial evidence. But in general, CSM have a tendency to progress to severe disability. Clark et al and Ebersold et al also mentioned the same findings.^{7,8} Hirai et al states that, the surgical approaches can prevent the progression of disease.⁹ Surgical approaches can be either anterior or posterior and study showed 85% improvement in their neurological status with a decrease in mean Nurick score of 0.78 and improvement in mean MJOA score of 2.11.

According to Morio et al above 70% of patients showed neurological improvement while in Curick et al 85% patients showed neurological improvement.^{10,11} Wilberg et al studied 99 cases of CSM and after surgery they got 80% neurological improvement and could arrest the progression of myelopathy by 95%.¹¹ Hirai et al studied 139 cases of CSM and there was a significant improvement in mean JOA score from 8.2 to 13 after decompression surgeries.⁸

Functional outcome of CSM decompression surgeries is dependent on several predictors like age of the patient, gender, duration of symptom, patient factors, techniques, cervical spinal levels of diseases etc. in which age is considered an important independent predictor. Many articles had studied the relation of age and functional outcome after CSM surgeries. Sixteen studies showed negative correlation while 27 articles reported no significant relationship. Nagashima et al, Furlan et al and Ogawa et al states, age as a negative predictor.¹³⁻¹⁵ Koyanagi et al studied OPLL cases and also observed age as a predictive factor for outcome after CSM surgeries.¹⁶

Hiroki et al observed 479 patients of CSM, 119 patients were age above 60 years. After 24 months of surgery,

younger patients achieved higher post-operative MJOA score and lower Nurick score than elderly patients.¹⁷

In this study, there observed statistically significant (p value =0.0012) values and age was found to be negative predictive factor in functional outcome of CSM surgeries. As age advances the improvement in functional recovery is less, still the neurological improvement is present. Hence surgery is recommended

In Zhang et al 459 cases were studied, in that 84% were C5/6 level spondylosis, while 55% were C4/5 level. Thirty two percent cases showed only one level disease. The study observed no significant difference in level of disease and functional outcome of surgery.⁶

In this study, C5/6 level disease was observed in 69% patients and 55% in C4/5 levels. And no significant difference in functional outcome was observed among the different level of disease.

Co-morbidities also considered as independent predictive factor for functional outcome of CSM surgeries. According to Kim et al, diabetes mellitus can adversely affect the outcome, and smoking has no role in the recovery.

In this study, 24 patients had preoperative DM and 14 patients had hypertension. In comparing pre op and post op scores of DM patients and non-DM patients, it was observed that functional outcome is better for non DM patients and the observations were statistically significant (p value =0.00391).

The study needs more samples to have accurate results.

CONCLUSION

Decompression surgeries of CSM have got significant function outcome, although there are certain factors that are correlated especially age, duration of disease and co-morbidity. Elderly age group was observed to be independent negative predictor for functional outcome. Still surgery provides neurological improvement. Diabetes mellitus was also observed to be independent negative predictor for functional outcome. The cervical level of disease, surgical approach, age and gender had no significant association with functional outcome.

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